glad to note that the author pays a tribute to the British Association Committee on Mathematical Tables, the activity of which has, unfortunately, in recent times somewhat slackened. The collection includes tables of the sine-integral, cosine-integral, and exponential-integral, the Fresnel transcendents, the gamma-function, the error-function, elliptic integrals, spherical harmonics, and the Bessel's functions of both kinds. Especially welcome are the tables of the latter function in which the argument is complex.

Every worker in applied mathematics will applaud this publication, and will wish it such success that it may be speedily followed by new and still more comprehensive editions.

(5) A "philosophical" discussion of the nature of centrifugal force is hardly suited for review in these pages. Such discussions are apt to resolve themselves into verbal questions, and we fear that the present one is no exception. The author insists, for example, on a distinction between "motive forces" and "resistances," the tension of a string being reckoned as belonging to the former category, the pressure of a smooth surface to the latter! The tract is lengthy and diffuse.

(6) A formal treatise on the theory of interpolation from the former professor of astronomy at Copenhagen is sure of respect. The present work is carefully written, and apparently from an independent standpoint. There is, indeed, hardly any explicit reference to the work of previous writers other than Newton and Lagrange, and novel notations are introduced freely without any reference to accepted forms which have long been in general use. The author claims for the subject an important place in schemes of mathematical instruction. To this we can hardly assent; processes of interpolation are, of course, constantly required, in one form or another, but a systematic study of the subject as an independent discipline would, in the case of most students, be an unnecessary infliction. The case of those who are training to become experts in certain special subjects is, of course, different.

H. L.

OUR BOOK SHELF.

An Introduction to Petrology. By F. P. Mennell. Second edition. Pp. viii+204. (London: Gerrards, Limited, 1910.) Price 8*s.* net.

This is a plain and clearly written introduction to a branch of geology that has assumed much importance among students, and it has the merit of including a short description of the minerals that go to make up rocks. The author's personal studies, as is well known, have been carried on mainly in Rhodesia, and there is something pleasant in finding familiar facts illustrated from Bulawayo, Kimberley, or the Rand. The palisade structure of basaltic flows is thus well seen in the view of the Zambezi gorge on p. 92. In addition, we gain by the introduction of the results of tropical weathering on rocks; and the remarkable banded siliceous ironstones of South Africa (p. 180) are referred to the concentration of mineral matter in a stratified series near the surface.

Theoretical questions are touched on sufficiently to arouse interest, and a sane balance seems to be preserved between what can be seen in the field and what may be variously inferred. The discussion of the absorption of schists and sediments by the granite of the Matopos and Mashonaland is sustained by evidence that seems convincing, and it has been our good fortune to go over something of this ground in the company of the author. The arguments derived from the amphibolites (p. 171) might have been supported by work of earlier date than that quoted, such as that done in Saxony and round Mont Blanc; but the introduction of matter of this kind, of chapter xiii. (on the origin and variations of igneous rocks), and of the well-reasoned chapter xix., on metamorphism, show that the author regards petrology as far more than the mere description of rock-specimens. Enough is said on each point to show what researches lie before the worker in the open country.

Simple and descriptive as the book is, it will undoubtedly encourage thought in all who read it. The illustrations are excellent, though we should like fewer rock-sections, and more landscapes, such as that on p. 101. Very few misprints—"Brux" for "Brüx," "Fougué" for "Fouqué," and "entectic" for "eutectic," twice on p. 89—have been noted. The formulæ of the silicates might be modernised in the next edition, since comparison is thus rendered more easy. On p. 70 the resemblance between kaolin and serpentine is unnecessarily obscured by a small difference of method. A comma is wanted in the dolomite formula on p. 75; but is not this better written $MgCa(CO_3)_2$? The change of appearance in a section of calcite when the polariser is rotated beneath it (p. 75) is due to differences in "relief" at the surfaces, and not to differences of absorption within the section. This well-printed book, as a whole, is a very pleasant one to read.

G. A. J. C.

Map of Eastern Turkey-in-Asia, Syria, and West Persia. Scale, 1/2,000,000, or 1 inch = 31·56 miles. (London: Royal Geographical Society, 1910.)

The issue of this map occurs at an opportune moment. Public attention has been much directed lately to the once fertile strip of country that lies between the deserts of Arabia on the one hand, and the mountains of Asia Minor on the other. It is needless to dwell here on the visions of the past that a mere inspection of the names on this map will call up in the mind of the historian. Looking to the future alone, it is obvious that we have before us the representation of a piece of country destined once again to play an important part in human history, and to be the scene of a busy commerce and a thriving agriculture. Whatever be the political difficulties now blocking the way, it is certain that before very long we shall see the construction of the railway joining the Mediterranean with the head of the Persian Gulf, a route possibly extending through southern Persia and Baluchistan to India itself. In the more immediate future we shall see the rich land that lies between and about the great twin rivers wake from its sleep of four centuries and water again flow through canals and irrigation channels long choked with the desert sands.

The report on the irrigation system recently published by Sir W. Willcocks makes it clear that, with no great engineering difficulties, and even with no great expenditure of capital, some, at all events, of the old irrigation works can be reopened and a large area of land once more taken into cultivation. The enterprise and energy with which this work is now actually being taken up is the best evidence of the change that has come over the spirit of Turkish administration since the advent of constitutional government.

It is sincerely to be hoped that the prime importance of carrying out an accurate survey in advance of agricultural development will not be lost sight of. In

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this matter the example of Egypt should be constantly borne in mind, both as showing the difficulties and loss incurred when survey is allowed to lag behind the necessities of land development and taxation, and also as an example of the methods upon which the cadastre of such a piece of country should proceed. The map before us is produced in the excellent style that its origin would lead us to expect, and the thanks of all geographers are due to its compilers and publishers. E. H. H.

The Anatomy of the Common Squid, Loligo Pealii, Lesueur. By L. W. Williams. Pp. xv+92. (Leyden: late E. J. Brill, n.d.) Price 10*s.*

THIS work, published under the patronage of the American Museum of Natural History, but printed in Holland without date, is a very complete and well-illustrated description of the anatomy of one of the commonest Cephalopods. As such it should meet with a warm welcome from all serious students of the mollusca. We believe the squid is a type not usually dissected by zoological students in this country, but for the sake of comparison, at any rate, the work should find a place in the zoological laboratory.

We do not expect very much in the way of novelty in a memoir of this kind, but the author is to be congratulated on the important discovery of a pair of giant nerve-cells situated in the pedal ganglion, and each giving off a giant fibre. The giant fibres pass backwards to the centre of the visceral ganglion, where they cross one another, forming a "chiasma"; each fibre then passes on through the viscero-stellate connective to the stellate ganglion of the side opposite its origin, where it divides into a number of branches, one of which enters each of the larger nerves given off from that ganglion. There appears to be no doubt about the facts of the case, which are sufficiently remarkable, but the term "chiasma" hardly seems suitable for the simple crossing of a single pair of fibres. According to the author, this is the first time such fibres have been described in any mollusc, though similar structures are, of course, widely distributed throughout the animal kingdom. We may mention that in the first text-figure we have what seems to be a variation of Lankester's well-known schematic mollusc which does not appear to us to be any improvement on the original.

The Siege and Conquest of the North Pole. By George Bryce. Pp. xvi+334. (London: Gibbings and Co., Ltd., 1910.) Price 7*s.* 6*d.*

As a record of a group of Arctic journeys which had the object of attaining the North Pole, this volume has a real value. It gives, usually in the explorers' own words, the most stirring stories of the Far North, many of which are now difficult to procure in the original form. The record only deals with the last hundred years, the three centuries of earlier efforts being dismissed in a brief introduction. The expeditions chronicled are those of Parry in 1827, Kane in 1853–5, Hayes in 1860–1, the German expedition of 1869–70, the *Polaris* expedition of 1871–3, the Austro-Hungarian expedition of 1872–4, the British expedition of 1875–6, the voyage of the *Jeannette* in 1879–81, Greely's in 1881–4, Nansen's in 1893–6, Sverdrup's in 1898–1902, the Duke of the Abruzzi's in 1899–1900, Peary's from 1886 to 1909, and lastly, Cook's in 1907–9. There were, of course, several other expeditions in the period covered, some, such as Andrée's, avowedly aimed at the pole; others, like the Jackson-Harmsworth, the Ziegler, and the Wellman expeditions, in which the attainment of the pole was at least as much an object of ambition as was the case with Nansen, and much more so than with Greely or Sverdrup. We are, indeed, inclined to suspect that the hope of gaining the fame of first reaching the pole has animated a good many explorers whose ostensible ideals were more modest.

The author's comments and criticisms are few, but usually sound; and we are the more surprised to find that in the light of the adverse opinion of the University of Copenhagen he was able to say "it is impossible at present to pronounce a final judgment" on the story of Cook's journey in 1908. The summing up is strongly in favour of Dr. Cook's claim, and Mr. Bryce does not seem to be staggered by the coincidence of a group of highly improbable statements. He seriously reproduces, without comment or criticism, the absurd assertion that, after finding a latitude of 89° 59′ 45″, the explorer advanced "a distance equal to the 15″." With the exception of the last chapter, however, we can commend the book unreservedly as giving in brief compass a graphic account of many of the greatest trials of human endurance. The sketch-maps suffer from the common fault of being over-reduced, but they help the reader to follow the narratives all the same.

The author does not point out, but the book itself bears abundant testimony to the fact, that the greatest results have been gained since the naval or military organisation of polar expeditions has been abandoned, and the personal ambition or scientific zeal of the leader has become the driving power of a small, well-equipped party, strong in the realisation of the lessons of past failure.

Les États physiques de la Matière. By Prof. Ch. Maurain. Pp. 327. (Paris: F. Alcan, 1910.) Price 3.50 francs.

THIS book is, as the title suggests, an exposition of the properties of matter in its various states. The author confesses, however, in his introduction, that he is principally concerned with the properties of crystals, the different states of solid bodies, liquid crystals and colloids. Thus we find only twenty-three pages devoted to the study of gases, and rather more than fifty to that of liquids. Prof. Maurain has found it convenient to preserve the old divisions of solid, liquid, and gas, but he points out that the distinctions are as regards degree only, and that no properties are peculiar to a particular state.

The treatment is practically devoid of mathematics. The contents of the book are mainly a collection of experimental facts, particularly those which have been brought to light by the use of the microscope and ultramicroscope. The former as applied to crystals, and the latter to emulsions and colloids, have recently widely extended the knowledge of these states of matter.

There are, in all, eleven chapters. The first is devoted to gases and gaseous ions. Reference is made to the kinetic theory, and estimates are given of the sizes and masses of the molecules. The second chapter deals with the properties of liquids. Much attention is paid to the question of the thickness of liquid films and its bearing on the molecular dimensions, and there is also included a discussion of the various methods of estimating the molecular weights of substances. In the next three chapters the properties of solid bodies are fully treated. The various systems of crystals are defined, and examples are given of their directed properties relating to thermal and electrical conductivities, elasticity, magnetism, and optics. The crystalline structure of solid bodies as seen through the microscope is described, and is applied to explain the various properties of metals. Chapter vi. deals mainly with the production of double refraction in isotropic bodies by external means, such as mechanical pressure and electric and magnetic fields. Liquid crystals form the subject of chapter vii. The special properties

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